

Rare-Earth element distribution in cross-cutting veins within a Bennu rock fragment

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We applied synchrotron X-ray fluorescence (SXRF) spectroscopy to analyse the distribution of rare-earth elements (REEs) in apatite-dolomite aggregates within two cross-cutting veins in rock fragment OREX-501079-0 from asteroid Bennu.

The REE results show a dichotomy between apatite (60-500 times CI) and dolomite (10-50 times CI) enrichment levels within the two veins. LREE-HREE fractionation patterns of the vein apatites are all similar, with a slight, gradual increase from Dy to Er and a clear increase from Er to Yb. A negative Ce anomaly, present in all of the Bennu vein apatites, may indicate a more oxidising environment within the veins, whereby Ce^{3+} was partly oxidised to Ce^{4+} , leaving less Ce^{3+} available for incorporation into apatite. We compare the REE-enrichments of Bennu vein-apatites with those of non-vein apatites in other Bennu and Ryugu rock fragments.

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